Filter

Background of the Invention

1. Field of the Invention

The invention generally relates to filters and more particularly to fluid filters.

2. Description of the Background Art

A typical spin-on filter has a painted metal outer housing with a threaded nipple centered in the base of the filter. In operation, pressurized fluid flows into the filter through multiple radially spaced apertures at the base of the filter. The fluid then flows through the filter media and into a center tube, and is then circulated out of the filter through the threaded nipple and back to the engine or host connecting apparatus.

The prior art also includes filter designs with plastic housings, and at least one filter design with a transparent plastic housing. However, these filters are difficult to manufacture and have significant structural and reliability issues associated with the filter's crimped plastic-to-metal interface.

Summary of the Invention

The invention comprises a spin-on filter with a transparent plastic housing. The transparent plastic housing is integrally formed with a thin metal flange such that the flange is permanently embedded into the transparent plastic housing. The metal flange is then connected to the cover plate of the filter assembly to form a fluid-tight seal. The invention allows a user to visually inspect the condition of the fluid and filter without removing the filter from an operating system.

Brief Description of the Drawing

Figure 1 is a sectional side view of the filter housing prior to assembly with other filter components.

Figure 2 is an expanded sectional view of the seal mechanism.

Figures 3 is a side view of the assembled filter.

Figure 4 is a perspective view of the assembled filter.

Detailed Description of a Preferred Embodiment

Figure 1 discloses a sectional side view of a filter housing assembly (4). The assembly (4) is comprised of a filter housing (1) formed around a thin metal flange (2). A compressible seal (3) may also be formed during the housing's manufacture. In the preferred embodiment, the filter housing (1) and compressible seal (3) are comprised of transparent plastic, and formed by an injection molding process. During the injection molding process, a thin malleable steel flange (2) is permanently and non-detachably embedded in the wall of the plastic filter housing (1) adjacent to the housing's open end.

Alternatively, the housing (1) and compressible seal (3) may be comprised of plastic or non-plastic, transparent or non-transparent materials. The compressible seal (3) may also be manufactured separately from a different material than the housing (1), and added to the assembly (4) later. A process other than injection molding may be used to manufacture the plastic components. Although the filter housing (1) and flange (2) may be thicker or thinner depending on a specific application, a typical filter housing may be 0.080 inches thick, and the flange may be 0.0149 inches thick.

Figure 2 discloses a detailed drawing of the housing assembly (4) connection with other filter components. The compressible seal (3) forms a fluid-tight seal between a

structural plate (7) and the housing (1). The structural plate is disposed between the compressible seal (3) and an exterior cover plate (5). In the preferred embodiment, the structural plate (7) and the cover plate (5) are comprised of metal, preferably steel. The portion of the flange (2) embedded within the housing (1) has an "L" shape, and emerges from the housing (1) perpendicular to the housing's (1) cylindrical wall. The flange (2) extends from the housing (1) around the peripheral edge of the structural plate (7) to form a crimped double-seamed connection with the exterior cover plate (5). The double seamed connection assures the integrity of the sealed unit by placing the compressible seal (3) in compression, and placing the flange (2) in tension. An elastomeric gasket (6) forms a mating seal with the host engine or connecting component. In the preferred embodiment, the elastomeric gasket (6) is comprised of rubber, however, the gasket (6) may be comprised of plastic, foam, or another suitable elastomeric material. Figures 3 and 4 disclose the completed filter assembly.

In operation, the invention functions identically to traditional filters. Pressurized fluid flows into the filter through multiple radially spaced apertures at the base of the filter. The fluid then flows through the filter media and into a center tube, and is then circulated out of the filter through the threaded nipple and back to the engine or host connecting apparatus. However, unlike traditional metal filters, the invention allows the user to monitor the condition of the filter and fluid without interrupting the operating process.

For the foregoing reasons, it is clear that the invention provides an improved fluid filter device. In addition to its visual inspection advantages, the invention also has operational advantages. By injection molding the flange (2) directly into the wall of the

transparent plastic housing (1), the invention overcomes the prior art's plastic-to-metal seal problems, and the resulting assembly (4) does not leak. The invention also has manufacturing advantages. By embedding the flange (2) into the wall of the housing, the plastic-to-metal seal-related assembly problems of the prior art are avoided, and the invention may be substituted directly into the traditional metal-housing assembly line without significant modification of the process. The ability to use existing machinery and processes to assemble the invention is an extremely significant advantage that allows the filter to be manufactured almost immediately, and avoids substantial re-tooling costs.

The invention may be used in automotive, transport, nautical, aeronautical, and medical applications, or in any process requiring fluid filtration. Although the materials of construction are generally described, they may also include a variety of compositions consistent with the function of the invention. For example, the structural plate (7), cover plate (10), or flange (2), may be comprised of any type of metal or rigid construction material consistent with the function of the invention. Similarly, components described as plastic may also be comprised of fiberglass, glass, epoxy composites, or other related materials. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.